Chapter =09

Biology 9th - Detailed Question Answers

➔ TRANSPORT

Q.1: Define and explain transport system in living organisms. What is its importance?

Ans: **Transport System**: Every organism requires number of substances for their survival and maintenance of healthy life. These substances or their raw materials are taken by Organism from environment or may be from internal sources. If the distance between source and required organ is small enough, organism does not require any transport system but if the distance is too long then the organism require to develop a system called transport stem.

The transport system requires at least two components.

(i) Transport of raw material from environment to organ where they required for metabolism.

(ii) Transport of metabolites from cell to organs where they require.

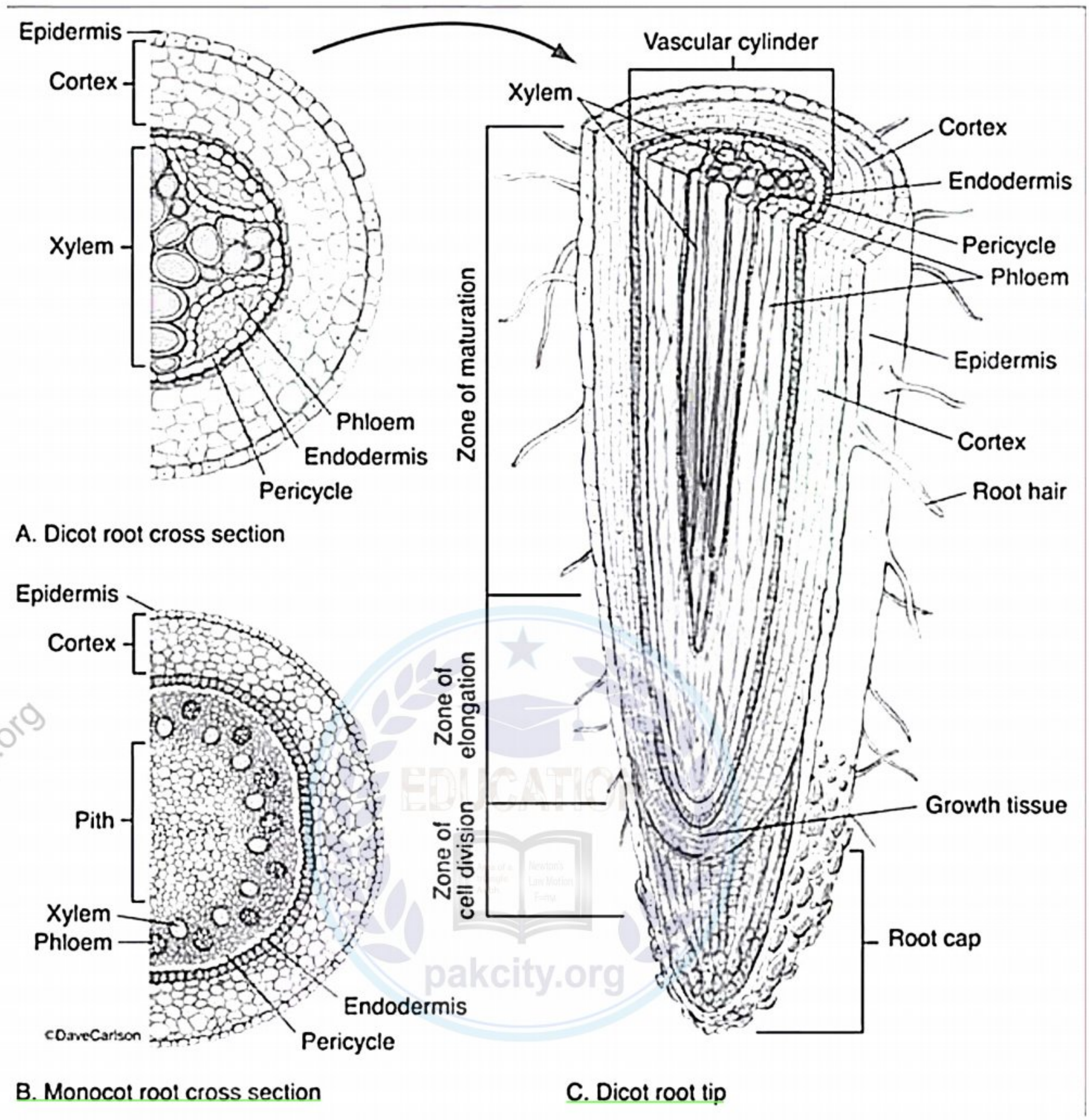
Plants are autotrophs which synthesize organic biomolecules from inorganic molecules. These inorganic molecules are transported from environment into plans, converted into biomolecules. These biomolecules are also transported within the plant where they required. Animals are heterotrophs which get organic molecules as food, digest them into digestive tract, diffuse into blood and transport to organs where required.

Q.2: Briefly describe the structure of roots.

Ans: **Structure of Roots**: Water and mineral salts enter the plant through root, so it is necessary to understand the external and internal structure of root. Externally, root has a root tip which is the growing part of root covered by root cap. The remaining part of root is highly branched and each branch is heavily covered by root hairs. Each root hair is a fine tubular outgrowth of an epidermal cell. It grows between soil particles and remains in close contact with the soil solution surrounding them.

Internally, we can study the root by taking transverse section (T.S.) of root. The T.S. of root shows that root is mainly consist of:

- Epidermis (Epidlema) the outer layer of cells, some of these cells have root hair.
- The Cortex part of root between epidermis and endodermis, consist of number of cellular layers.



Q.3: Define passive and active transport?

Ans. The root absorbs water and minerals from soil through root hairs. There are two processes of transport:

(i) **Passive Transport:** The uptake of water and mineral by osmosis and diffusion without using energy of ATP. It is due to concentration gradient i.e. always takes place from high to low quantity of substances.

(ii) **Active Transport**: .Movement of substances from low quantity to high quantity i.e. against the gradient and it requires energy of ATP. This movement is called active transport.

Q.4: Describe the uptake of water from soil through roots in plants.

Ans: **Uptake of Water From Soil**: The root hair is long, thin and tubular structure. It increases the surface area which increases the rate of absorption of water and minerals. The cell membrane prevents the cell sap (a mixture of sugar, salts and amino acids in solution form) from leaking out. The cell sap has low tendency of water loss i.e. water potential, then the solution of soil which result in water movement from soil to root hair. This process of water potential is called Osmosis.

Ascent of Sap: As a result of osmosis of water, the root hair become turgid and their cell-sap become dilute than that of adjacent cells so the water moves from root hair to their neighbour cells. In this way, water may pass from cell to cell and finally forced into xylem and ascend up to the aerial part of plant. This upward movement of water with mineral is called ascent of sap, other factor and forces are also involved in ascent of sap.

Low Solute Quantity in Soil: For absorption of water by root, it is necessary that the solute quantity in soil solution should be low and solute quantity in sap should be comparatively high, otherwise the direction of water movement will be reversed and plant may die due to dehydration.

Q.5: Describe mineral transport in plants.

Ans: **Mineral Transport:** Plants also require minerals i.e. nitrates, sulphates, phosphates etc.

These minerals are also taken up by root hair in two ways:

(i) By diffusion, when the concentration of certain ions in soil is higher than that in root hair cells i.e. passive transport.

(ii) By active transport, plant requires some substance even they found in soil in low quantity. The roots have to absorb these ions against a concentration gradient by using energy of ATP, which is active transport.

Q.6: Define diffusion. Give two examples.

Ans: **Diffusion:** "It is the movement of molecules from the area of higher concentration to the area of lower concentration." OR "It is a process in which the random movement of the molecules or ions takes place from a region of higher concentration to a region of lower concentration."A few substances freely diffuse across the cell membrane. For example oxygen, carbon dioxide diffuse in and out of the cells.

Explanation with examples: Diffusion is a well known phenomenon. It can be clearly explained by these examples.

Examples No 1: When an ink drop is placed into a beaker of water, initially surrounding turns coloured. The colour then spreads progressively until all the water is uniformly coloured.

Examples No 2: If we spray perfume in one corner of a room, initially its fragrance will be strongest in that corner and will spread by diffusion in all areas of the room.

Q.7: Describe the importance of diffusion with example.

Ans: **Importance of diffusion:** Importance of diffusion can be describe as follows:

(i) **Help in Biological process:** In the plants during photosynthesis and respiration the exchange of carbon dioxide and oxygen gases, between the cell and the atmosphere take place by diffusion.

(ii) **Help in transpiration**: During stomatal transpiration, water vapours from the intercellular spaces escape out in the outer atmosphere by the process.

(iii) **Small organisms use diffusion**: Many small organisms such as Amoeba and Hydra depend on diffusion for obtaining oxygen and getting rid of carbon dioxide.

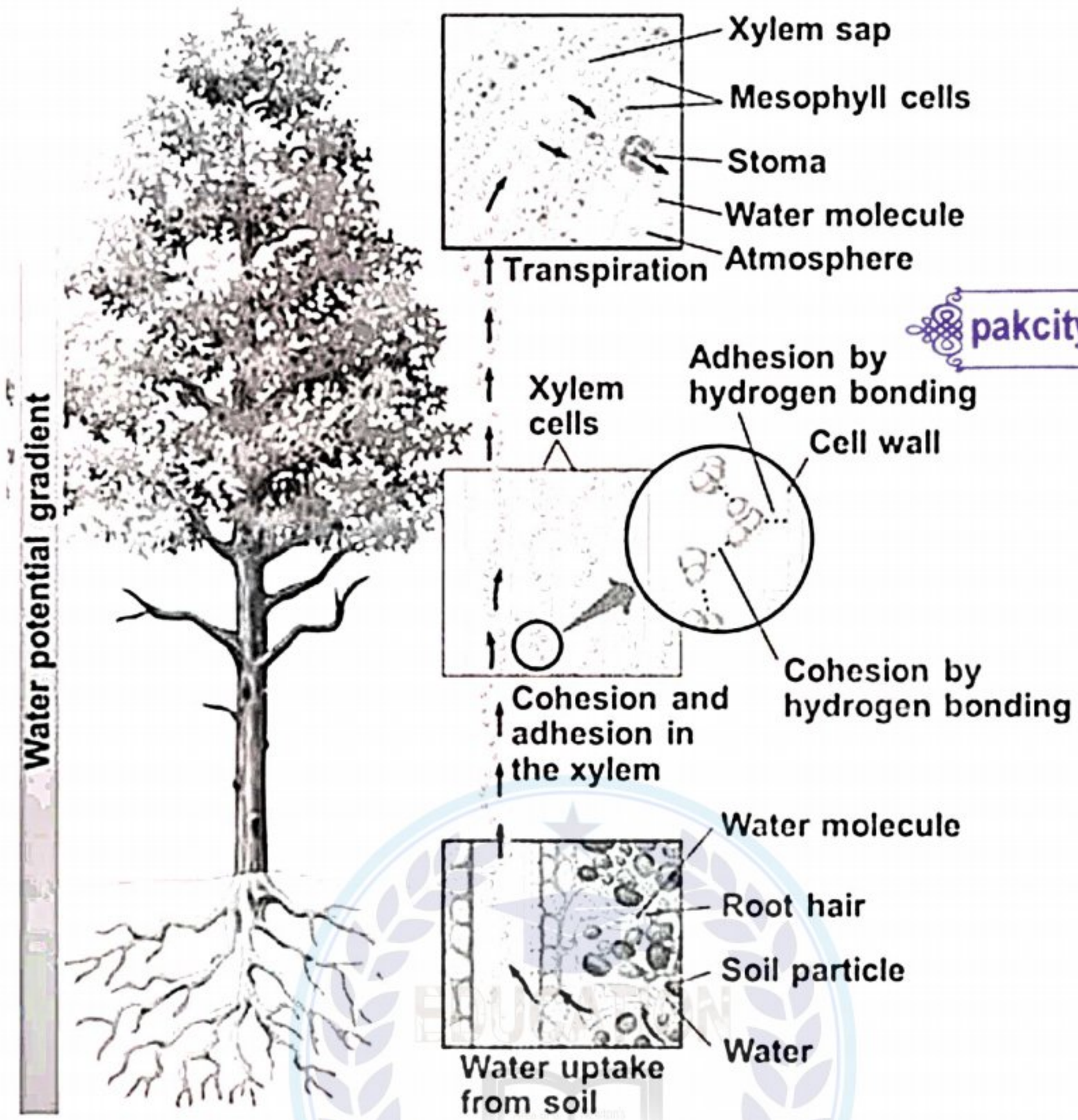
(iv) **Large animals depends on diffusion:** In the lungs of large animals, the exchange of gases (carbon dioxide and oxygen) between air and blood also takes place by diffusion.

Q.8: What is meant by osmosis? Write its importance.

Ans: **Osmosis:** "It is a special type of diffusion. In this process water molecules move from higher concentration to lower concentration through semi permeable membrane." OR "Osmosis is a process by which solvent molecules (water) diffuse across selectively permeable membrane, from a region of low solute concentration to the high solute concentration."

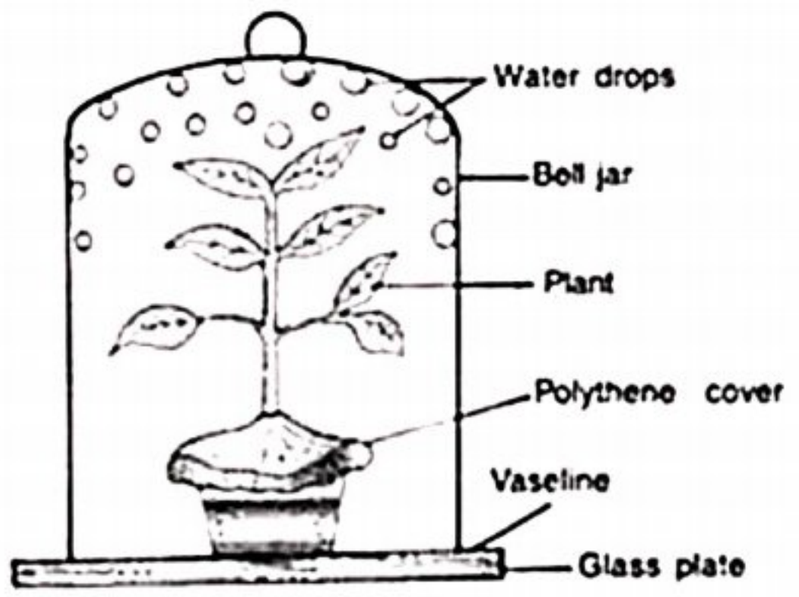
Q.9: Define transpiration.

Ans. **Transpiration**: Plants absorb water continuously from soil. Some of its quantity utilized in photosynthesis and other metabolic function while the rest is retained in cell to maintain turgidity of cell. Some water is removed in the form of vapours. This loss of internal water of plant in the form of vapours from aerial part of plant is called transpiration. Transpiration mainly takes place through special pores guarded by specialized guard cells called. Stomata (sing: stoma).



Activity: Evidence of Transpiration

- Take a potted plant and wrap a polyethylene bag around pot not around the plant to make sure that water is not coming from soil of pot and surface pot.
- Place the pot on the glass plate and cover it with dry bell jar.
- Take another jar without plant for control setup.
- Put these two jars side by side in an area where light fall on it for two hours.



Observation: We will observe water droplet at the bell jar which has plant while other jar remains dry.

Q.10: How many types of leaves are there on the basis of stomatal distribution?

Ans: Plants have three types of leaves on the basis of stomatal distribution.

(i) Leaves that have stomata at lower epidermis called bifacial leaves e.g. leaves of mango plant.

(ii) Leaves that have stomata at both surface (upper and lower epidermis called monofacial leaves e.g. leaves of maze plant.

(iii) Leaves that have stomata at upper epidermis only e.g. leaves of water lily.

Activity: To find that transpiration mainly take place through stomata perform simple experiment.

Requirement: Few leaves, petroleum jelly or wax, scale etc.

Procedure:

- Take three leaves of peepal or mango tree where stomata are mainly present at lower surface of leaves.
- The leaves should be of equal size.
- Treat leaves as follow:
  - Leaf 1-cover the upper epidermis surface with petroleum jelly or any wax.
  - Leaf 2-cover lower surface with same.
  - Leaf 3-cover both surface with same.
- Weight each leaf before and after covering.
- Hang these leaves near window in sunlight.
- After few hours note the conditions and weigh again.
- Leaf which loss more weight transpire efficiently.
- It will be observed that the leaf 1 transpire more efficiently because it has stomata at lower epidermis.

The experiment shows that most of the water vapour is lost from the surface where stomata are present.

Q.11: Describe the relation of transpiration with leaf surface.

Ans: **Relation of Transpiration with Leaf Surface:** Surface area of leaf is also an important factor for the rate of transpiration, because the larger size leaves have high number of somata which increase the rate of transpiration.

Q.12: Why the leaves of desert plants modified as spines?

Ans. The desert plants require to save their water so they have smaller size leaves or their leaves becomes spines to reduce number of stomata as well as rate transpiration.

Q.13: What are stomata? Describe its structure and working.

Ans. **Stomata:** Stomata are the pores usually found in the leaf epidermis.

Structure: A stoma (singular of stomata) is surrounded by two kidney shaped, guard cells, these cells contain chloroplast while other epidermal cells do not. The guard cell control the opening and closing of stomata.

The inner wall of guard cell is think and inelastic whereas the outer wall is thin, elastic and permeable.

Mechanism of Stomata: The changes in the turgidity of guard cell controls are opening and closing of stomata.

Opening and Closing of Stomata: Stomata open when the guard cell becomes turgid and close when the guard cells become flacid. The turgidity of guard cell is regulated by concentration of solutes present in it which mainly depends upon the rate of photosynthesis. Opening and closing of stomata is one of the important factors to control rate of transpiration. The stomata remain open during the sunny day; as a result rate of transpiration increases. But at night they are closed, hence transpiration also stops.

Q.14: Define the terms transpiration pull and transpiration stream.

Ans. **Transpiration Pull:** Transpiration maintains low concentration of water and high concentration of solute in cell i.e. high solute potential. The high solute potential of leaf cells attract more water and draw more water from xylem. This continuous withdrawal of water from xylem develops deficit or water in xylem which develops a pull or tension called transpiration pull.

Transpiration Stream: As a result of this transpiration pull and water attraction for other water molecules i.e. cohesion of water, what is pulled upward in the xylem vessels through a continuous column called transpiration stream, which helps in ascent of sap.

Q.15: Describe importance of transpiration.

Ans. **Importance of Transpiration:** Transpiration plays an important role in the life of plants.

(i) **Provide a Suction Force:** By active transpiration, a suction force the transpiration pull is created which helps in the upward movement of water and minerals.

(ii) **Help in Absorption:** Transpiration also increases the rate of absorption.

(iii) **Remove Excess of Water:** Transpiration helps in evaporating excess amount of water.

(iv) **Prevent Overheating:** Transpiration maintains a suitable temperature for the leaves and prevents overheating.

(v) **Help in Ascent of Sap:** It helps in ascent of sap.

(vi) **Help in Stomatal Movement:** Stomata are opened and closed by guard cells due to transpiration which indirectly influence the process of photosynthesis and respiration.

(vii) **Cause Wilting:** Excessive loss of water from aerial parts also results in wilting and dehydration leading to death of plants in extreme conditions.

Q.16: Describe the factors which affect the rate of transpiration.

Ans. **Factors Affecting the Rate of Transpiration:** The rate of transpiration is also affected by some of the following environmental factors.

(i) **Temperature**: Rate of evaporation of water from cell surface increases with increase in temperature,

(ii) **Humidity**: Transpiration takes place only when concentration of the vapours must be low outside than inside, so dry atmosphere is also the condition for transpiration. The rate of transpiration decreases with the increase in water vapours in atmosphere i.e. humidity.

(iii) **Wind**: The increase in wind velocity increases the rate of transpiration. The wind decreases the water vapours around plant and make the atmosphere dry.

(iv) **Atmospheric Pressure:** Low atmospheric pressure increases the rate of transpiration through reduction in the density of air.

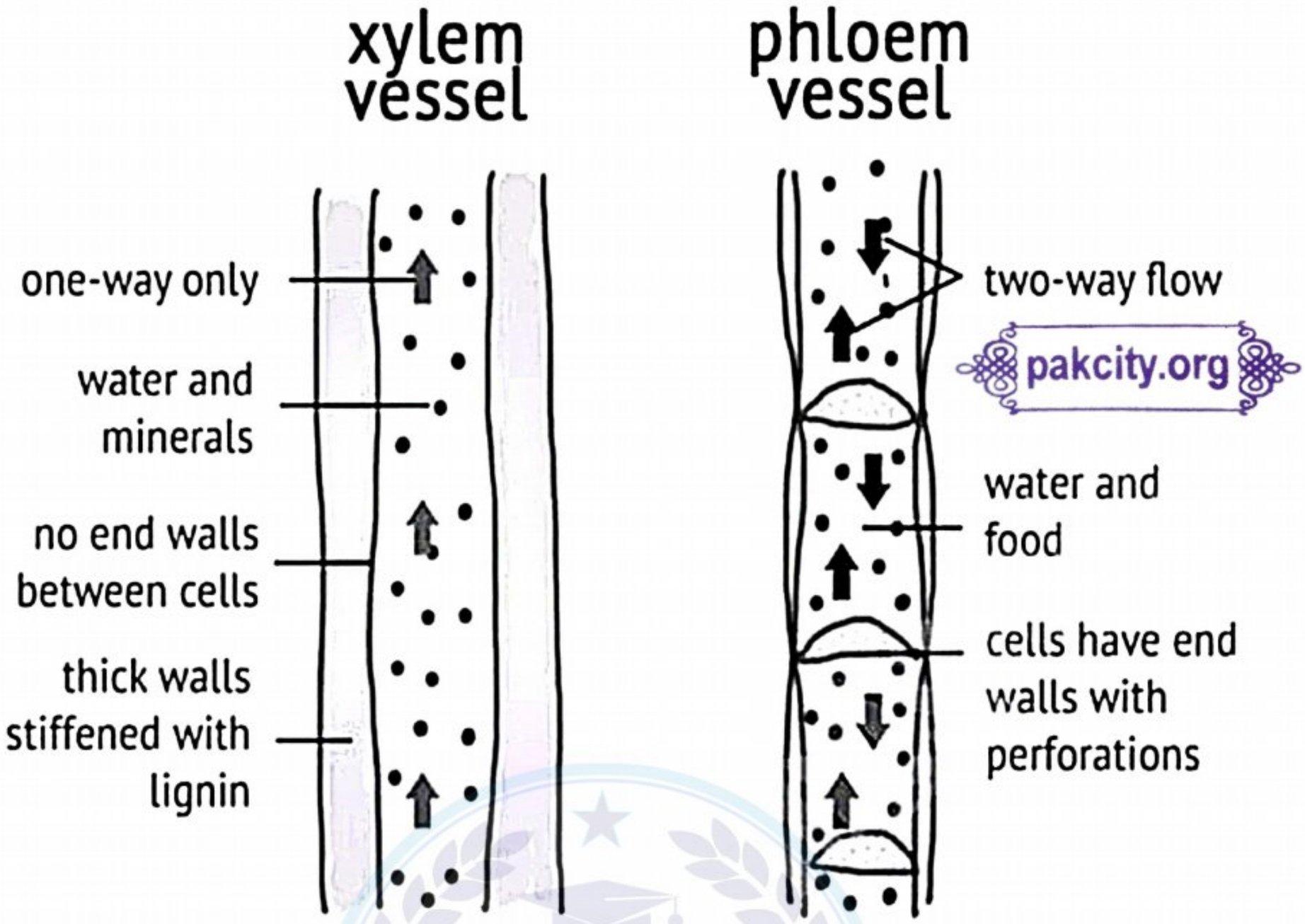
Q.17: Describe the transport of water and food in plants.

Ans. **Transport of Water and Food in Stem**: Flowering plants have a system of vessels for transport of water, minerals and food. These vessels are called transport or vascular tissues.

There are two types of transport tissues in plants.

(i) **Xylem (Wood):** In flowering plants xylem is made up of four types of tissues but the main tissues are the xylem vessels. A xylem vessel is a long, hollow, tubular structure from root to leaf. It is made up of many dead cells arranged vertically. The walls of these vessels become strong by the deposition of chemical substance called lignin.

Dead cells of xylem vessels arranged vertically have empty space inside called lumen, without protoplasm and end walls. This tube reduces the resistance of water flowing through the xylem. It gives faster passage to sap, as a result transpiration pull is created in leaf. The thick, rigid and lignified walls of vessels also provide mechanical support which strengthens the wall.



Phloem (Bast): Like xylem, phloem is also made up of four types of tissues but mainly consist of sieve tubes and companion cells. Phloem conducts manufactured food (sucrose) from part of plant where it is synthesized in high quantity to other parts of plant where it is required.

Sieve Tubes: The sieve tubes or sieve tube elements of phloem is made up of columns of elongated and thin walled living cells. The transverse walls separating the cells have lots of minute pores. The cross walls look like a sieve and therefore called sieve plates. A mature sieve tube cell has only a thin layer of cytoplasm inside the cell. This cytoplasm is connected to cells above and below through sieve plates. Each sieve tube cell has lost its central vacuole, nucleus and most organelles.

Companion Cells: Each sieve tube cell has a companion cell beside it, which carries out the metabolic processes need to keep the sieve tube cells alive. Each companion cell is narrow, thin walled cell with many mitochondria, cytoplasm and nucleus. Companion cells provide nutrients and help the sieve tube cells to transport manufactured food.

In contrast to sieve tube cell, the companion cells have· many mitochondria to provide energy needed for the companion cells to load sugar from mesophyll cell to sieve tube cells by active transport. The perforations of sieve plates allow rapid flow of manufactured food substance through the sieve tube.

Q.18: Describe the transport in animals.

Ans: **Transport in Unicellular Animals:** Cytoplasm of unicellular animals remains very much close to plasma membrane which remains in contact with environment. In these animals oxygen can diffuse through the body surface and reach easily to energy producing organelles. Similarly, the waste products can rapidly move from the body by simple diffusion.

Transport in Multicellular Animals: On the other hand, in multi-cellular organisms like mammals including man, many cells are situated away from environment. Only simple diffusion is not enough to supply O_2 (oxygen) to these cells and to get rid of wastes from there. It needs proper transport system to carry substances from one part of the body to another.

Q.19: Define translocation. Describe Munch theory. OR Describe mechanism of translocation.

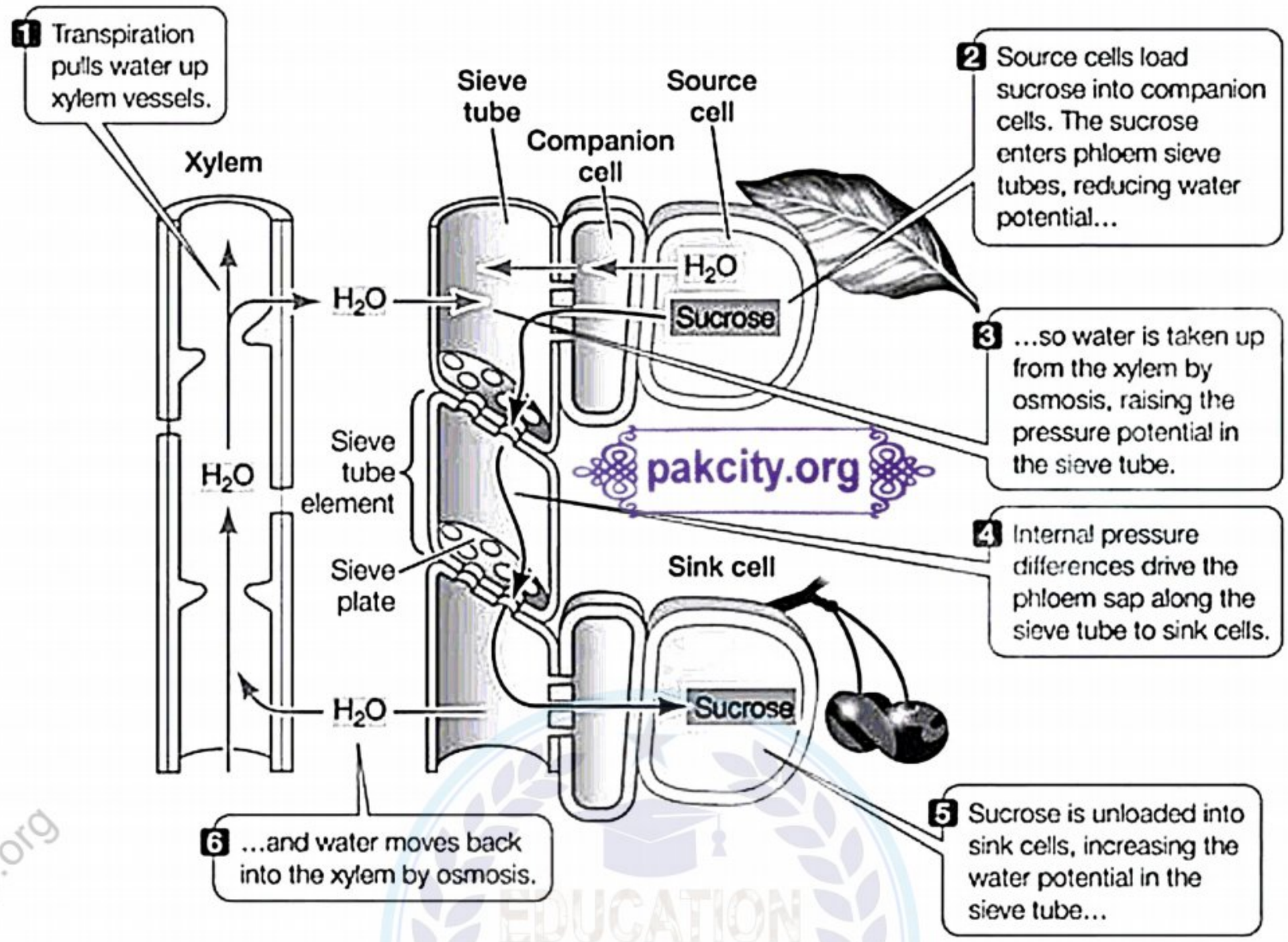
Ans: **Translocation:** In higher plant, only the green parts specially leaves can manufacture food and it must be supplied to other non-green parts like root, stem and flower for consumption and storage.

The movement of organic materials (food) takes place through phloem. Along with food, phloem also conducts other substances such as vitamins, hormones etc. the movement of prepared food from leaves to different parts of plant through phloem elements (sieve tubes) is called translocation.

Mechanism of Translocation: It is an established fact that translocation of solutes takes place through phloem but it is still debatable that how it occurs. Several hypothesis and theories have been proposed to explain the mechanism of translocation. Among them bulk flow or Munch hypothesis is the most convincing.

Munch Theory (OR Bulk Flow Theory): According to this hypothesis, solutes are translocated through the sieve tubes which flow in bulk from the supply end i.e. source (leaves) to the consumption end i.e. sink (root) under a turgor pressure gradient.

As a result of photosynthesis, the supply ends (leaves) have a large amount of organic solutes, which causes tremendous increase in suction pressure of leaf cells (Mesophyll cells) and they draw water from the xylem of the leaf. As consequence their turgor pressure is increased. The turgor pressure in the cells of stem and root is comparatively low and hence, the soluble organic solutes begin to flow in mass from mesophyll through sieve-tubes down to the cells of stem and root under the gradient of turgor pressure. These solutes are either consumed or stored in insoluble from. The excess water is released back into the xylem vessels.



Q.20: What is circulatory system?

Ans: **Circulatory System:** The system involved in the transport of various substances within the body of an animal is called Circulatory system. The circulatory system transports gases like O_2, CO_2 etc. nutrients, wastes, hormones and defense proteins.

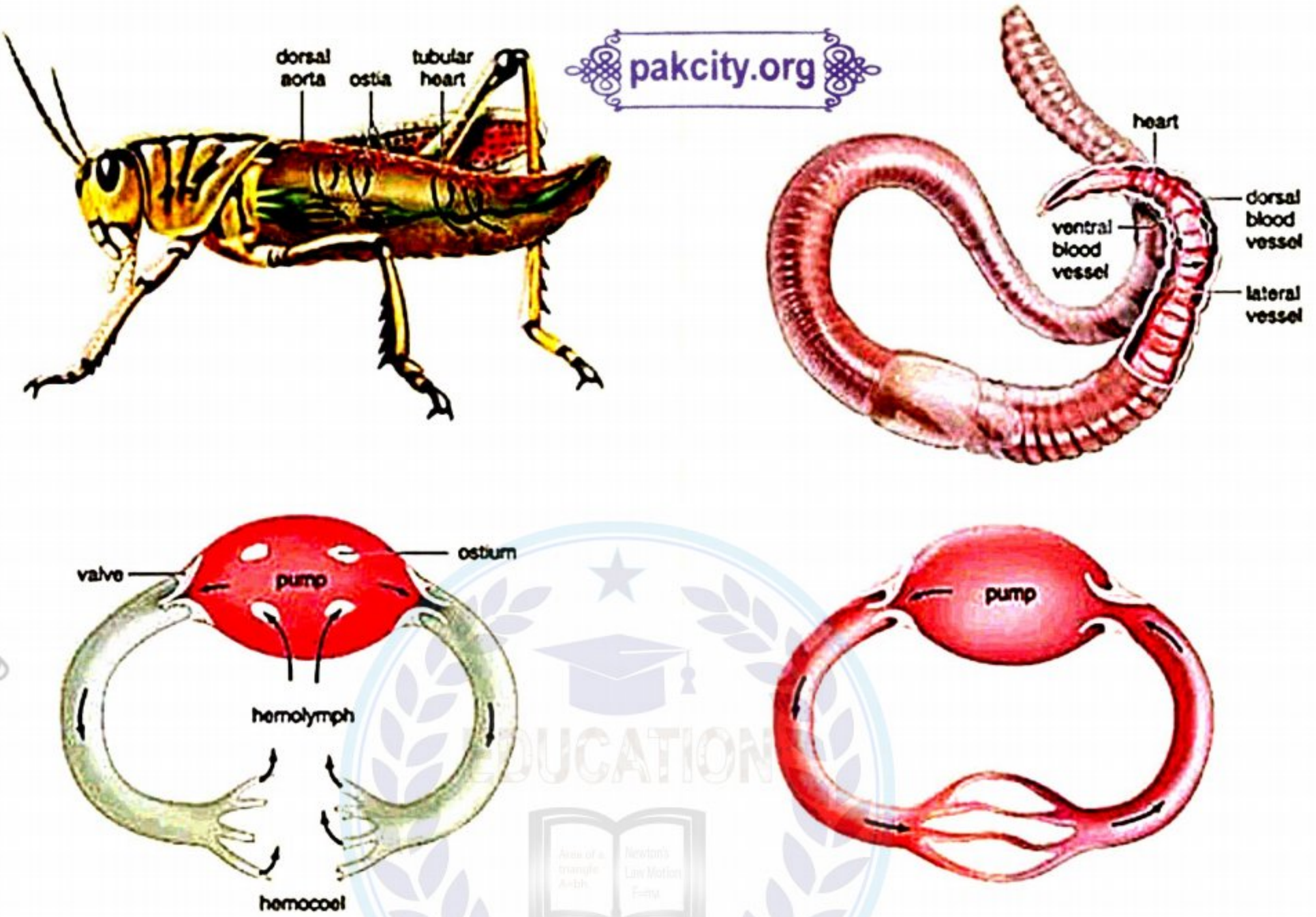
Q.21: How many types a/circulatory system are in animals? Name and define them with examples.

Ans: **Types of Circulatory System**: There are two types of blood circulatory System found in animals.

(i) Open circulatory system (ii) Closed circulatory system

(i) **Open Circulatory System**: In this type of Circulatory System blood flows through the spaces among tissues so it directly comes in contact with tissues. It remains filled in the open tissue space called Sinuses. After exchange of materials with tissues, blood enters the pumping organs or heart which pumps it into blood vessels. These vessels drain out blood into sinuses so it remains in Circulation. This types of circulatory system found in arthropods and molluscs.

(ii) **Closed Circulatory System:** This type of circulatory system allows blood to flow inside the closed tubular blood vessels and never comes out in direct contact with tissues. Most vertebrates and some invertebrates, such as this annelid earthworm, have a closed circulatory system.



Open circulatory system *Closed circulatory system*

Q.22: Which type of circulatory system is found in man? Write the names of the components of the circulatory system of man.

Ans: **Transport in Man:** In man, closed type of circulatory system is found, which consists of following components.

(i) **Blood:** It is a fluid with cells and other dissolved substance.

(ii) **Heart:** It is a pumping, pulsatile organ.

(iii) **Blood Vessels:** They are tubes i.e. arteries, veins and capillaries.

This is much more efficient and rapid system of transport.

Q.23: What is blood? Describe the composition of blood and explain its functional importance. OR What is blood? Write components of blood. Also give their functions.

Ans: **Blood**: Blood is a special type of connective tissue, found in the form of fluid which circulates in the body. It transports substances in the body of an organism. It consists of two parts:

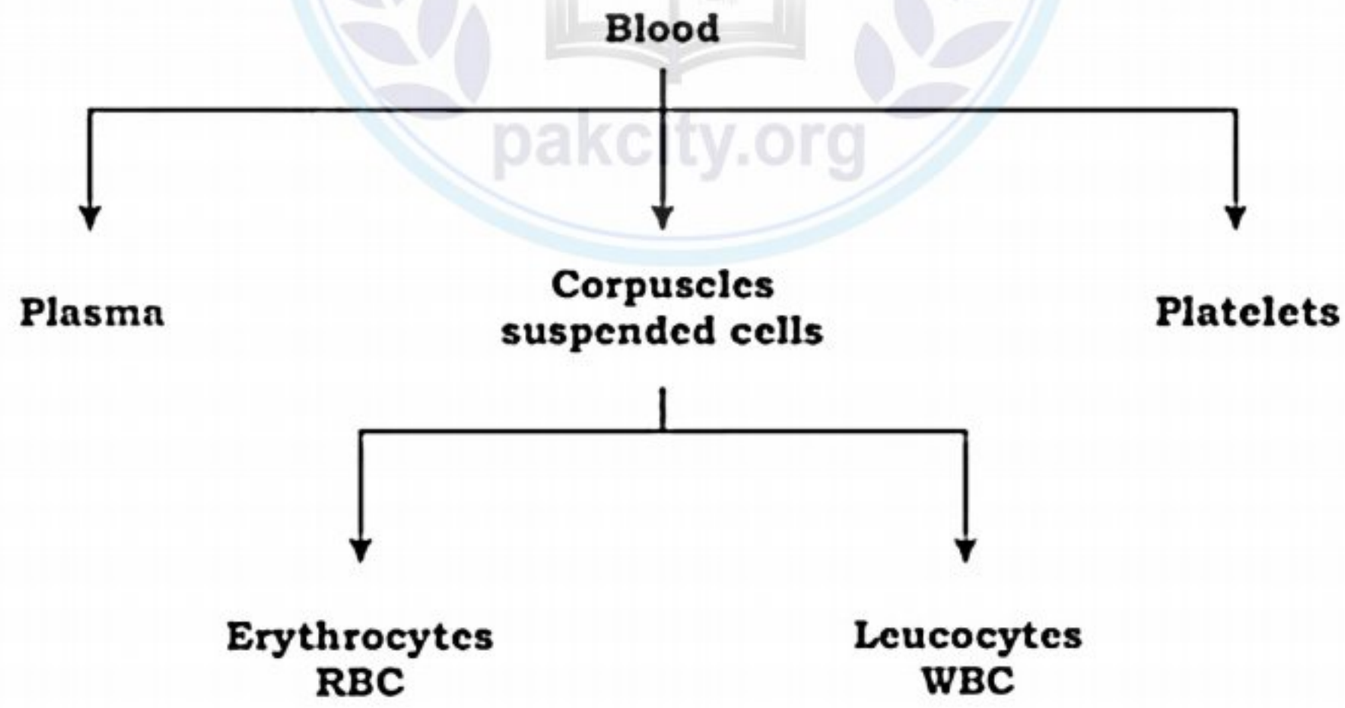
(i) Plasma (ii) Corpuscles

(i) **Plasma:** Plasma is the fluid part of blood and constitutes about 55% by volume of whole blood. It is pale yellowish liquid. About 90% of plasma is water in which complex mixture of various substances are dissolved. There are dissolved mineral salts like bicarbonates, sulphates, chlorides and phosphates of sodium (Na) and potassium (K). All these are found in the form of ions. Salts of calcium are also present in blood for clotting of blood.

Soluble proteins are also present in plasma i.e. Serum albumin, Serum globulin, fibrinogen and prothrombin. The last two play important part in clotting of blood. Antibodies are also present in plasma, which are involved in fighting diseases.

Plasma contains digested food substances such as glucose, amino acids, fatty acids and vitamins. It also contains excretory products such as Urea, Uric acid and creatinine. Carbon dioxide (CO_2) is also present as bicarbonate ions. It also contains hormones.

Function: It provides medium for exchanging of materials between the body cells and the blood.



(ii) **Corpuscles OR Blood Cells:** In man, 45% of the blood consists of blood cells. The blood cells are of following three types:

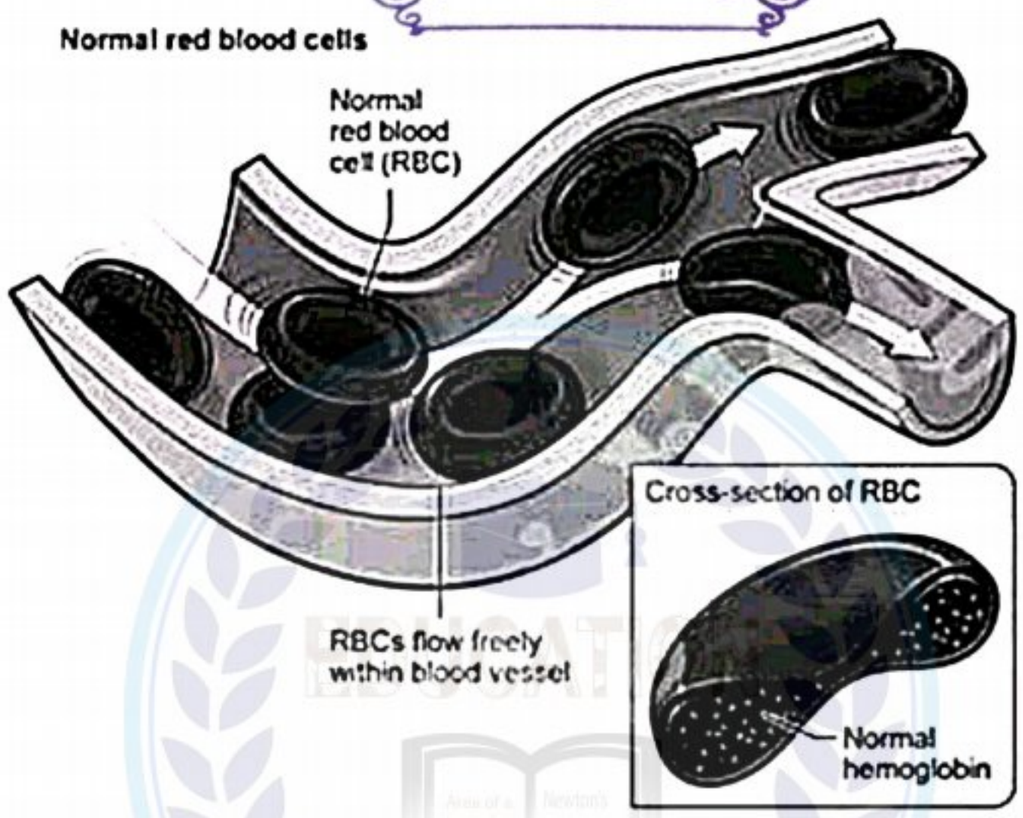
(a) Red blood corpuscles (RBCs)

(b) White blood corpuscles (WBCs)

(c) Platelets

(a) **Red Blood Corpuscles (RBCs):** R.B.Cs in mammals are circular, disc like, biconcave cells. Their mature R.B.Cs do not have nucleus, mitochondria, endoplasmic reticulum and Golgi bodies. $1mm^3$ (1 drop) of blood contains approximately 5 million R.B.Cs. They contain hemoglobin which is the respiratory pigment. It transports oxygen and carbon dioxide. It readily combines with oxygen in lungs and transport it to all the tissues of the body. Deficiency of hemoglobin slows down the metabolic activities. The red colour of the blood is due to this material of the RBC.

Function: R.B.Cs contain hemoglobin which is the respiratory pigment. It transport oxygen, from the lungs to other tissues of the body, and from the tissues, the carbon dioxide to lungs.

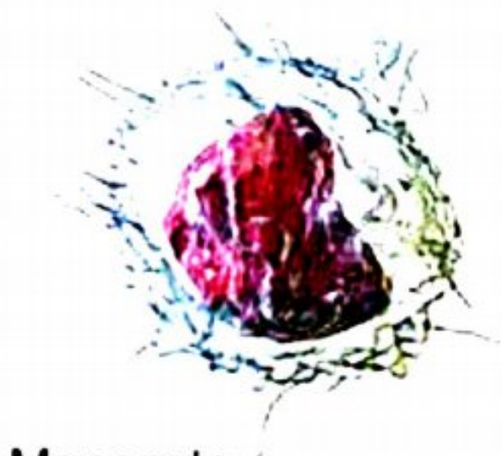


Erythrocytes (R.B.Cs)	
Shape	Bi-concave; Circular like disc
Size	0.007 – 0.008mm in diameter
Composition	Non-nucleated, contain red pigment hemoglobin protein containing iron.
Quantity	5,000,000 /cubic millimeter
Place of production	Bone marrow
Life	120 days on Average
Place of distribution	Spleen and liver
Function	Transports O_2 from lungs to body cell. Transports CO_2 from body cell to lungs.

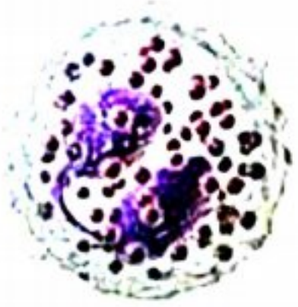
(b) **White Blood Corpuscles (WBCs):** They are colourless, irregular in shape, nucleated and larger than of R.B.Cs. $1mm^3$ (1 drop) of blood contains approximately 7 thousand W.B.Cs.

They are of several types and can be distinguished on the basis of the shape of the nucleus. They have the ability to differentiate between their own body cells and the foreign cells.

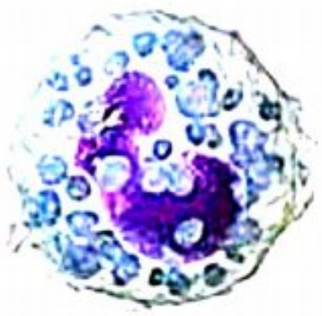
Function: W. B.Cs are commonly known as "Police of the body" because they protect the body by killing the germs and provide defence against diseases.



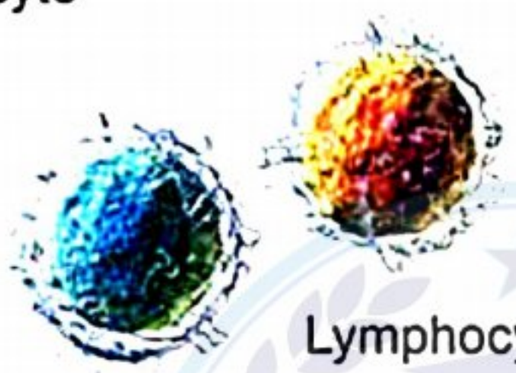
Monocyte



Eosinophil



Basophil



Lymphocytes

Neutrophil

There are several types of white blood cells which perform different functions.

Break down of Haemoglobin

Haemoglobin → **Iron released (stored in liver)**

Haemoglobin → **Bile pigments (excreted in GUT)**

Leucocytes or W.B.Cs (Police of the Body) 7500/cubic millimeter

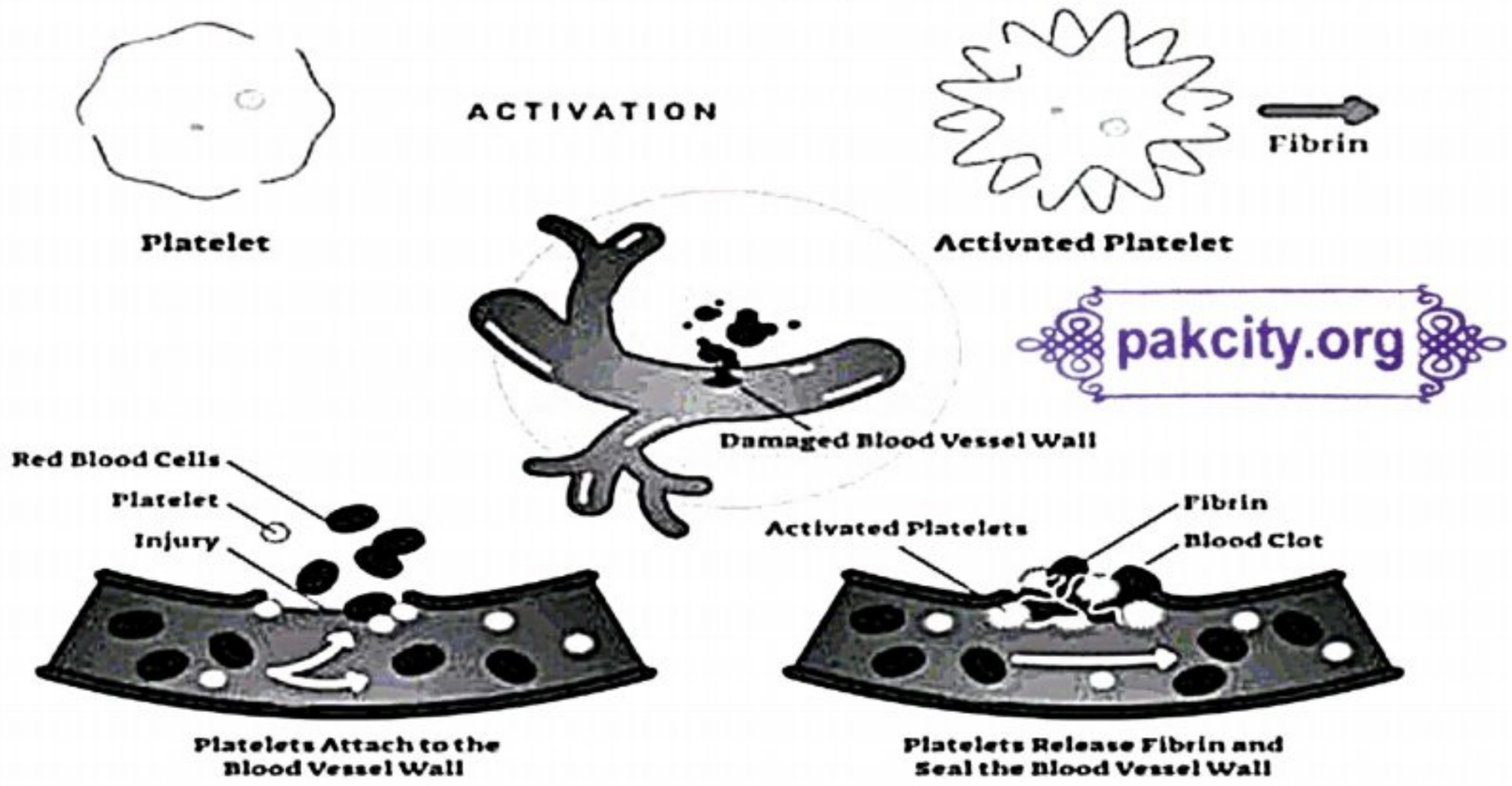
- **Granulocytes**
  - **Basophils**
  - **Neutrophils**
  - **Eosinophils**
- **Agranulocytes**
  - **Monocytes (Phagocytes)**
  - **Lymphocytes**

Type of WBCs	Description	Average number	Function
(A) Granulocytes			
Neutrophils	About twice the size of RBCs, nucleus 2 to 5 lobed.	62% of W.B.Cs	Destroys small particles by Phagocytsis
Eosinophils	Nucleus bibbed	2% of W.B.Cs	Inactivates inflammation producing substances, attack parasite
Basophils	Nucleus bibbed	Less than 1% of W.B.Cs	Release heparin to prevent blood clots and histamine which causes inflammation
(B) Agranulocytes			
Monocytes	3 to 4 times larger than RBCs, nuclear shape from round to lobed	3% of W.B.Cs	Marcophages, destroys large particles by phagocytosis
Lympocytes	Slightly larger than RBCs, nucleus nearly occupies cell	32% of W.B.Cs	Immune response by producing antibodies

(iii) **Platelets**: Platelets are the fragments of cells which are formed from large precursor cells in the bone marrow. On injury, exposure to the air stimulates the platelets at cut end to produce in enzyme in blood. This enzyme causes the soluble plasma protein fibrinogen to form insoluble fiber of another protein fibrin which forms a network of fibers around wound.

Function: It protects blood to flow that is called clot, which prevents bleeding and stops the entry of pathogen.

Platelets
(Thrombocytes)



Q.24: Describe the major functions performed by the blood.

Ans: Functions of blood are as follows:

(i) **Transport of Gases:** Blood transports oxygen from the lungs to other tissues of the body and brings back CO_2 from the tissues to lungs.

(ii) **To Defend the Body:** It defends the body by killing the germs, which somehow enter the body.

(iii) **To Transport Nutrients:** It transports nutrients from the gut to all parts of the body.

(iv) **Removal of Nitrogenous Waste:** It transports nitrogenous waste from tissues to excretory organs to expel them out.

(v) **Transport of Hormones:** Blood transports hormones from the endocrine glands to their target organs.

(vi) **Temperature Control:** It also maintains uniform body temperature.

(vii) **Distribution of Heat:** Blood circulates in the body continuously and thus it helps to distribute the heat in the body uniformly to all parts of the body.

(viii) **Stop Bleeding:** Due to presence of platelets and fibrinogen protein, blood makes a clot to stop bleeding.

Q.25: What are the parts of closed circulatory system? Write about heart and its function.

Ans: Closed circulatory system consists of following parts:

(i) Heart (ii) Blood vessels (iii) Blood

It is a muscular, pulsatile organ. It pushes blood into a blood vessel (Artery) which gives off many branches each leading to a different organ of the body. In each organ, the artery breaks up into microscopic vessels, the capillaries which form a network. The exchange of various substances between blood and the tissues of the body takes place here. Later capillaries gradually fuse together to form veins which bring the blood back to the heart.

Function: Heart is a muscular pumping organ & its continuous beating makes the blood to circulate in the body.

Q.26: Define heart rate.

Ans: **Heart Rate:** The number of heartbeats in a minute i.e. the heart rate can be measured by the beating of heart. On average, a healthy heart beats 72 times in a minute. The normal range of heart is 60-100 beats in a minute. It is necessary to keep the heart rate within the normal range. The slow of fast heart rate may cause severe heart diseases. The heart rate may vary from person to person.

Q.27: Write a note on blood disorders.

Ans: **Blood Disorders:**

(a) **Leukemia:** It is a type of cancer that affects the blood, bone marrow and lymphatic system. In this type of blood cancer, number of W.B.C.s increases and R.B.Cs decreases.

Symptoms:

- Fever of chill
- Frequency or severe infections
- Swollen lymph node
- Easy bleeding or burnishing
- Ting red spots on skin
- Bone pain or tenderness
- Persistent fatigue, weakness
- Loss of weight without try
- Enlarge liver or spleen
- Recurrent nose bleeding
- Sweating at night

Causes: Leukemia is thought to occur when some blood cells acquire mutations in their DNA. Some abnormalities cause the cell to grow and divide more rapidly and continue living when normal cells would die. With passage of time, these abnormal cells in the bone marrow, leading fever healthy white blood cells, red cells and platelets.

- Genetic disorder
- Smoking
- Exposure to certain chemicals
- Family history

(b) **Thalassemia:** It is the name of a group of inherited conditions that affect the blood hemoglobin. Persons having Thalassemia do not produce or produce little amount of hemoglobin, which is used by red blood cells to carry oxygen around the body . Person having problem of Thalassemia have following symptoms:

Symptoms:

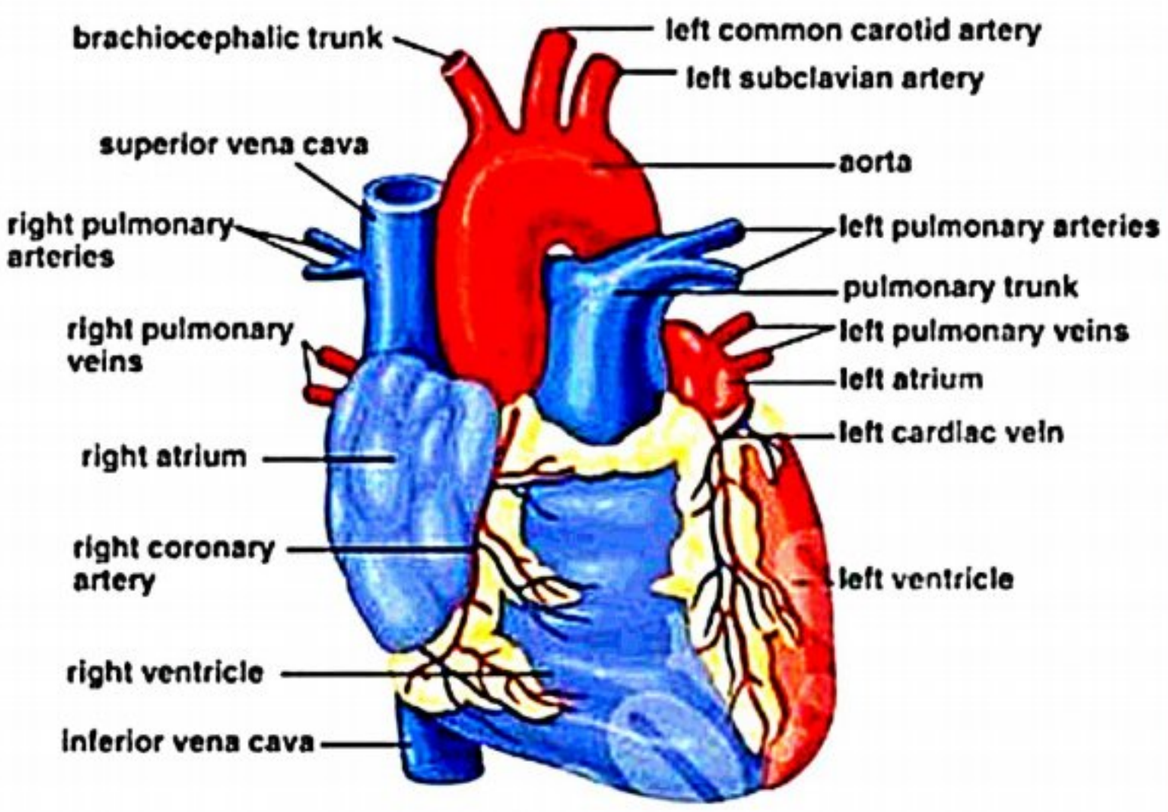
- A pale and results appearance
- Slowed growth and delayed puberty
- An enlarge spleen, liver or heart
- Poor appetite
- Dark urine
- Jaundice

(c) **Thalassemia Major:** It occurs when a child inherits two mutated genes, one from each parent. Children born with this disorder usually develop the symptoms of severe anemia within the first year of life. They lack the ability to produce normal, hemoglobin and feel chronic fatigue.

Thalassemia minor have occurred when a child inherit it from one of the parent. Persons have mild anemia and slight lowering of hemoglobin level in the blood. It resembles with mild iron deficiency anemia. People with this disorder do not have any symptoms.

Q.28: Describe the external and internal structure of human heart.

Ans. **External Structure of Heart**: Heart is the major organ of circulatory system. It is a muscular pump which keeps the blood circulating throughout the body. It is located in the thorax slightly at the left side. It is enclosed in a fibrous bag like protective cover called Pericardium. It is conical in shape externally. The space between pericardium and heart is pericardial cavity which is filled with a fluid called pericardial fluid. This fluid reduce friction and Pericardium protects the heart, prevent it from over extension.



Internal Structure of Heart: Internally, it consists of four chambers:

- The upper two are thin walled called atria (singular: artrium),
- The lower two are thick walled called ventricles.

Atria: Atria are thin walled chambers. They are completely separated from each other by a septum called interatrial septum. The right atrium receives deoxygenated blood from all tissues of the body. The left atrium receives oxygenated blood from the lungs. Each atrium is connected with its ventricle by an auriculoventricular aperture.

The function of atria is to stretch to receive blood as it returns to the heart and them contract with enough force to push the blood through the atrioventricular valves into the ventricles. This requires a lower pressure than that developed in the ventricles, so the walls of the atria are much thicker and more elastic than those of the ventricles.

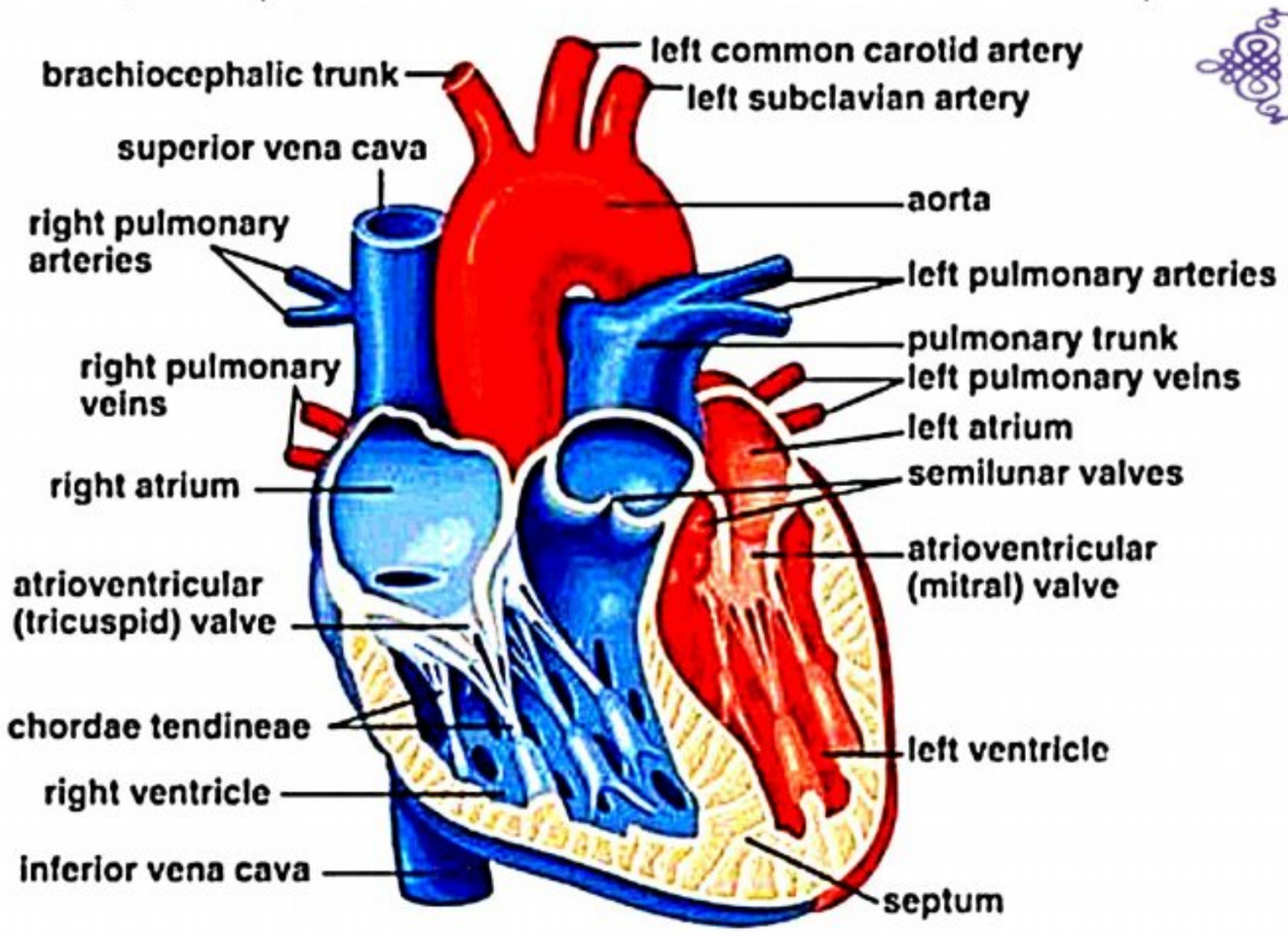
Ventricles: Similarly, the two ventricles are also separated from each other by a muscular partition called inter-ventricle septum.

The right atrium and right ventricle are connected by Tricuspid Valve. Similarly, left atrium and left ventricle are connected by bicuspid valve. These valves prevent the backward flow of blood from the ventricles to the atria. Two main blood vessels are arising from ventricles to carry blood from heart to all parts of the body.

The blood from the right ventricle is pumped through pulmonary arch to the lungs for oxygenation while the blood from the left ventricle is pumped through a systemic aorta to all the parts of the body. The pulmonary arch and systemic aorta, both are guarded by semi-lunar valves to prevent backward flow of blood.

There is difference in thickness and narrow in space. This is related to their functions. The right ventricle only pumps blood to the lungs while the left ventricle pumps blood to all other parts of the body. The resistance to blood flow through the body capillary networks

is for higher than that through the lung capillaries so, a high pressure is developed in the systemic circulation, it requires a thicker muscle wall and narrow space.



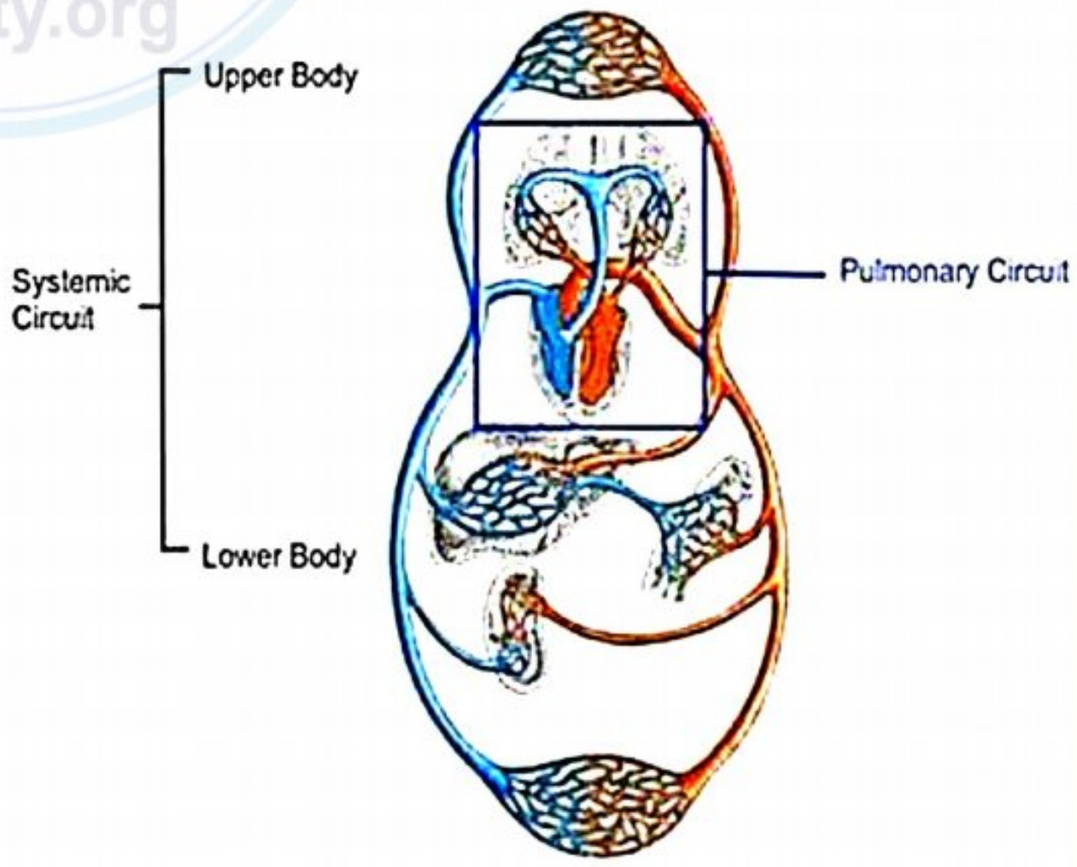
Q.29: Explain double circuit circulation in man. OR Explain mechanism of circulation in human.

Ans. **Double Circuit Circulation in Man:** The circulation of blood in our body is called double circuit because it circulates blood in two separate circuits and enter twice in heart during complete circulation. These two circuits are:

(i) Pulmonary Circuit - from heart to lungs and back from lungs to heart.

(ii) Systemic Circuit -from heart to different organs and from ,organs back to h

(i) **Pulmonary Circuit:** It transports blood from right ventricle to lungs through pulmonary arteries and flow back to heart in left atrium through pulmonary veins.



The deoxygenated blood from all over the body except lungs received in right atrium and then collected into right ventricle, upon contraction of ventricle this deoxygenated blood enters into pulmonary arch which supply this blood to the lungs, where blood gives up its CO_2 and receives O_2 from air at capillary level. The deoxygenated blood now becomes oxygenated which flow back to the left atrium through pulmonary veins. This oxygenated blood now circulates through the body by Systemic Circulation.

(ii) **Systemic Circuit**: Circulation of oxygenated blood from left ventricle through systemic aorta to all organs of body and back to heart by superior and inferior vena cava as deoxygenated blood is called systemic circulation or circuit. Upon contraction the left ventricle forces oxygenated blood into systemic aorta, the largest artery of our body. Initially, the aorta gives off three branches which supply blood to head, arms and shoulders.

This aorta then descends down and gives off many branches which supply blood to their respective organs e.g. a branch which supplies blood to liver called Hepatic artery, another branch called renal artery supplies blood to the kidney and coronary artery to heart etc.

Q.30: Define heart beat and describe its phases.

Ans: **Heart Beat:** The pumping of blood by the rhythmic pulsation of heart throughout the body is called heartbeat.

It is a two phase pumping action of blood that takes less than a second.

The First Phase: When blood is collected in the left and right atrium, the heart receives an electrical signal that causes the atria to contract. This contraction pushes blood in to the right and left ventricles through tricuspid and bicuspid values respectively.

The Second Phase: The second phase of pumping blood begins when the ventricles are full of blood. The electrical signals travel along a pathway of cells to the ventricles, this causes ventricles to contract. The relaxation of heart muscle and allowing the chambers to fill with blood, this phase of heartbeat is called diastole. The connection of heart muscle and pumping the blood from the chambers into the arteries named as systole.

Q.31: Describe the effects of slow and fast heart rate.

Ans: **The Effects of Slow Heart Rate**: The decreasing heart rate is a result of slow heartbeat, which leads to condition called bradycardia. In this condition, the heart rate is too slow (to below 60 beats per minute) due to very slow heartbeat. This slow heart rate reduces amount of blood and oxygen to vital organs of body, and causes shortness of breath, dropping of blood pressure, extreme fatigue etc.

The Effects of Fast Heart Rate: On the other hand, when a heart beats very fast (more than 100 beats per minute), this condition is called tachycardia. Due to this rapid heart rate, the function of heart becomes very hard. It means that the heart does not have enough time to fill with blood and enough blood is pumped forward. The tachycardia is caused by the fever, dehydration, excessive caffeine or a reaction to medication. Chest pain, dizziness and fainting are the symptoms of tachycardia.

Cause of tachycardia can be:

- Sudden cardiac arrest
- Heart failure
- Weaken heart muscle
- Lung diseases

Q.32: Define pulse rate.

Ans: **Pulse Rate:** Contrary to the heart rate, the pulse rate is exactly equal to the heartbeat. If the heartbeat is faster so as the pulse rate and if the heartbeat is slower, the pulse rate will be slower too. Taking a pulse is therefore a direct measure of heart rate.

Q.33: Describe the main veins of human body.

Ans: **Main Veins of the Body**: Blood returned to the heart by the main veins as follows: Pulmonary veins bring oxygenated blood from the lungs to the left atrium of the hear. Inferior vena cava runs upwards parallel to the dorsal aorta and brings deoxygenated blood from the lower body. Among these are renal vein bringing blood from kidneys, hepatic vein bringing blood from the liver and femoral veins brings blood from lower limb to the right atrium. Superior vena cava brings deoxygenated blood from the heat, neck and arms to right atrium.

Q.34: Describe blood vessels with their structure.

Ans: **Blood Vessels:** These are tubes in which blood circulates in the body in a closed circulatory system. They run through all of the tissues of the body, while some blood vessels are as wide as our thumb, most of them are much finer than a. human hair. There are three types of blood vessels, which are:

(i) Arteries (ii) Veins (iii) Capillaries.

(i) **Arteries:** The blood vessels that carry blood from heart to various organs of the body are termed as arteries.

Function: Arteries carry oxygenated blood (except pulmonary artery) away from the heart. Right ventricle of heart pumps blood into the pulmonary artery that goes to the lungs. Left ventricle of heart pumps blood into the aorta (largest artery in body). Every organ receives blood from arteries that branch off the aorta. The first branch called the coronary artery, carry blood to the walls of heart itself. Other branches carry blood to the brain, intestine and other organs.

Structure: Arteries are thick walled and more elastic than veins. Their inner space or lumen is narrow. The wall of an artery is composed of three layers.

(a) The innermost layer is made up of epithelial tissues.

(b) The middle layer consists mostly of smooth muscle and elastic fibers.

(c) The outer wall is made up of flexible connective tissues.

Because of layered structure arteries have both strength and flexibility.

The arteries on reaching closer to the tissues, divide into arterioles. The arteriole further divide into very fine branches, the capillaries.

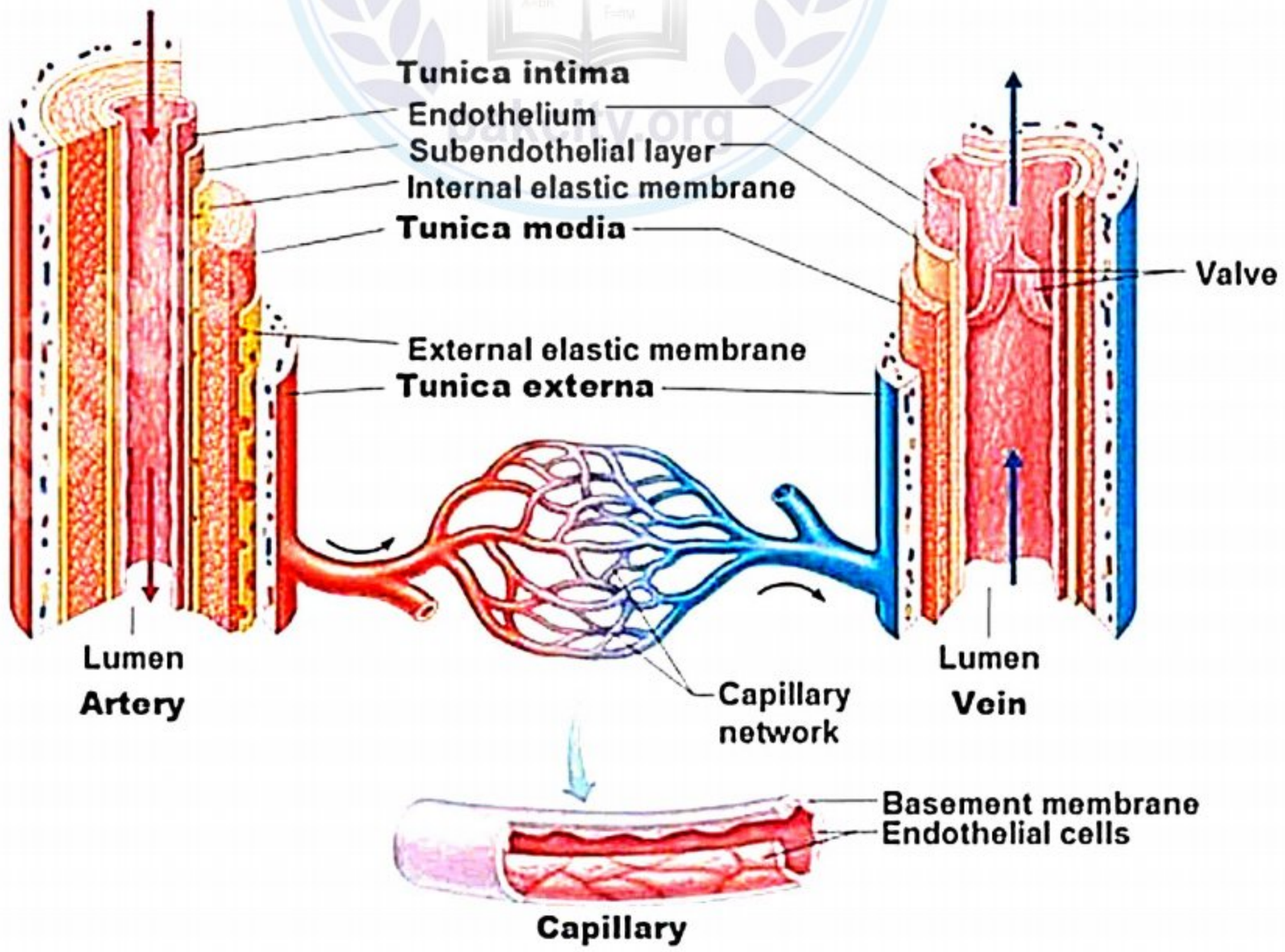
(ii) **Veins:** Veins are the blood vessels that bring deoxygenated blood (except pulmonary vein) back to the heart. They are formed by the union of smaller branches called venules which in turn are formed by the fusion of capillaries with the other.

Structure: The walls of veins, like those of arteries have three layers, with muscle in the middle layer. However, the walls of vein are generally thinner than those of arteries. They have large lumen.

Blood pressure in the veins is much lower than the blood pressure in the arteries. Semi lunar valves in the veins prevent) backflow of blood. Flow of blood along the veins is assisted by the action of skeletal muscles on the veins.

(iii) **Capillaries:** They are microscopic blood vessels found in the cells of tissues where exchange of various substances occurs between blood and the surrounding tissues.

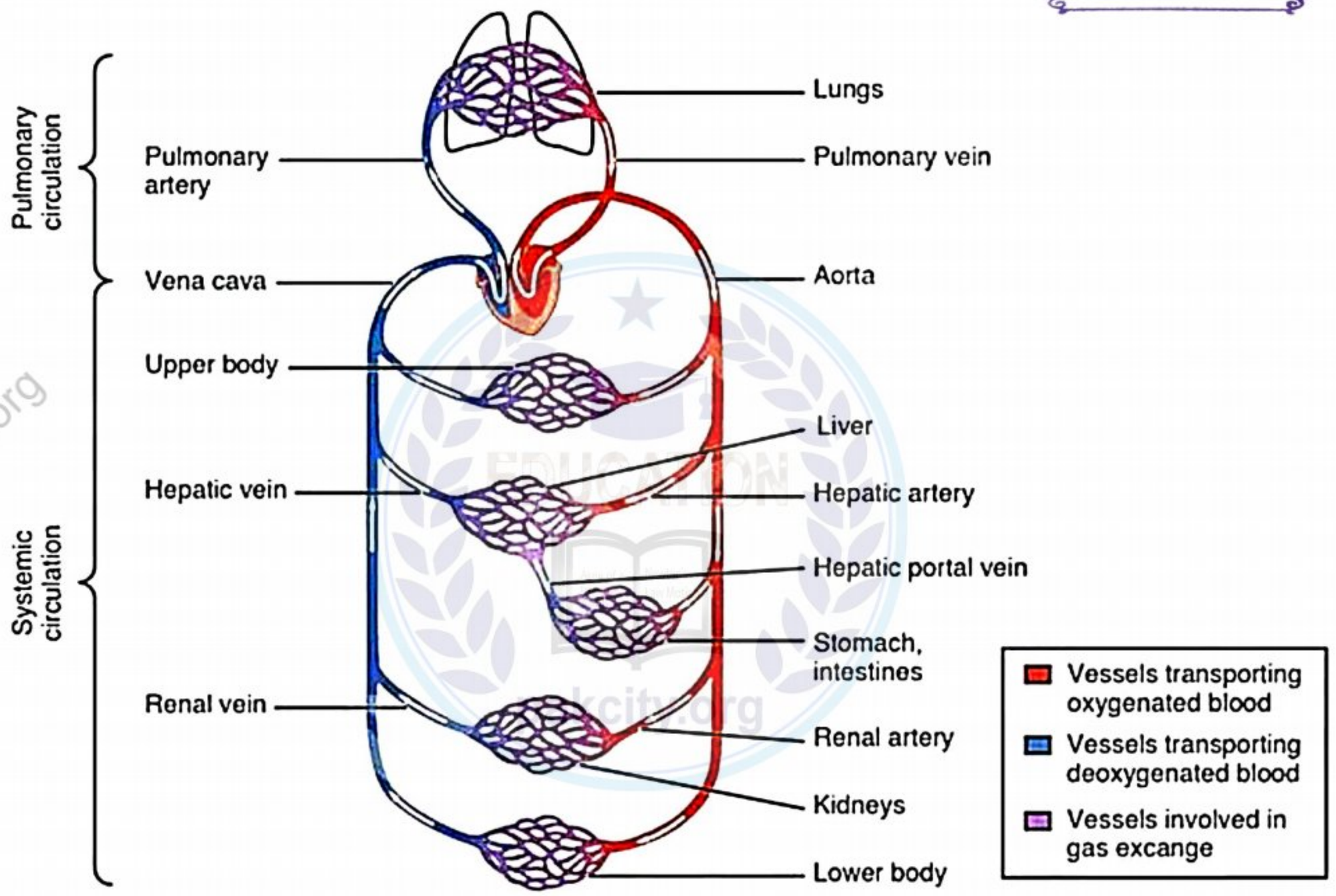
Structure: They have walls made up of single layer of flattened cells called endothelium. Capillary walls are partially permeable that enable substances diffuse readily through it. They are originated from arterioles and branches repeatedly to provide large surface area for the exchange of substances between the blood and the tissue cells.



Q.35: Describe the main arteries of human body.

Ans: **Main Arteries of the Body**: The pulmonary artery which originates from the right ventricle carries deoxygenated blood towards the lungs and aorta which originates from the left ventricle carries oxygenated blood towards the body. Aorta terminates into arteries of the head, neck and arms. Aortic arch curls backward to the left side of the heart and continues downwards as the dorsal aorta, which distributes blood to regions of the body below the heart.

For example, it supplies blood (oxygenated) through hepatic artery to the liver, renal artery to kidney and femoral artery to lower limb.



Q.36: Who explained pulmonary and systematic circulations?

Ans: Ibn-al-Nafees was the first Arab-Physician to explain pulmonary circulation. He believed that all the blood that reached the left ventricle passed through the lungs.

William Harvey was an English Physician to explain systematic circulation in detail. He believed that blood being pump to the brain and body by the heart.

Q.37: Describe cardiovascular disorders (CVD).

Ans: **Cardiovascular disorders (CVD):** In recent days CVD becomes leading cause of death around the world so it is essential to understand them.

Atherosclerosis (ATH): Most common among cardiovascular disease is atherosclerosis is (ATH). ATH is disorder in which bad fats (i.e. low density lipoprotein or LDL and cholesterol) get deposited in blood vessels internal layer.

Accumulation of fats leads to gradual narrowing of lumen of blood vessel. Narrow lumen leads to gradual compromise of blood supply to target organs, and leads to myocardial infarction and stroke.

Atherosclerosis: It is a process in which arteries loss their elasticity due to some pathological process (e.g. ATH) or simply by aging. Loss of elasticity leads to high blood pressure which may eventually be able to lead to vascular hemorrhage.

Causes of Myocardial Infarction: Causes of myocardial infarction can be divided into non modifiable factors (which we cannot change) and modifiable factors (which we can change)

Non-modifiable factors	Modifiable factors
Sex (More in males)	Stationary life (no exercise)
Age (More in old age)	Smoking
Race (More in blacks)	Stress
Family history	Heavy alcohol consumption
	High fat diet

Q.38: What is vascular surgery?

Ans: **Vascular Surgery:** Vascular surgery is a prominent field of surgery in which vessels i.e. arteries, vines and lymphatic vessels are managed by vascular surgeons. Field gained very prominence when surgery involves bypass surgeries of heart, angioplasty and fistula formation in cases of renal failure.

Q.39: What do you know about the leading causes of death in Pakistan?

Ans: **Leading Causes of Death in Pakistan:** In 2018 cardiovascular disorders (ischemic heart diseases) and stroke (paralysis which is due to damage of brain tissue) becomes major cause of deaths in the world. Stationary life style, poor socioeconomic status; unavailability of state of the art facilities of health, unavailability of doctors in rural areas, lack of health and dietary awareness, etc. all contributed to increase incidence of cardiovascular disorders in our country.

Q.40: Differentiate between the following:

(i) Pulmonary circuit and systematic circuit

(ii) Open type circulatory system and close type circulatory system

(iii) Xylem and Phloem

(iv) Arteries and Veins

(v) W.B.Cs and R.B.Cs

Ans. (i) Difference between Pulmonary circuit and systematic circuit

	Pulmonary Circuit	Systematic Circuit
1.	It carries deoxygenated blood from the right ventricle of the heart to the lungs through the pulmonary artery.	It carries oxygenated blood from the Left ventricle of the heart to the rest of the body by the aorta.
2.	It carries oxygenated blood from the lungs to the left atrium of the heart by the pulmonary vein.	It carries deoxygenated blood from the body to the right atrium of the heart by the superior and inferior vena cava
3.	It is composed of pulmonary artery and pulmonary vein.	It is composed of inferior and superior vena cava, aorta, and other small blood vessels.
4.	It carries blood to the lungs.	It carries blood throughout the body.
5.	It helps to release carbon dioxide from the blood while dissolving oxygen in the blood.	It helps to provide nutrients and oxygen to the metabolizing cells in the body

(ii) Difference between Open type circulatory system and close type circulatory system

	Open type circulatory system	close type circulatory system
1.	The hemolymph directly bathes the organs and tissues.	The blood circulates within closed vessels.
2.	The blood and interstitial fluid cannot be distinguished.	Blood and interstitial fluid are distinct.
3.	Blood is pumped into the body cavity.	Blood is pumped through the vessels by the heart.
4.	Capillary system is absent.	Capillary system is present.
5.	Blood is in direct contact with the surrounding tissues.	Blood is not in direct contact with the tissues.
6.	Nutrients are exchanged directly between blood and tissues.	The nutrients are exchanged via tissue fluid.
7.	No transport of gases.	Gases are transported.

8.	The fluid flowing in this system is called hemolymph.	Fluid flowing in this system is called blood.
9.	No respiratory pigments are present.	Respiratory pigments are present.
10.	The volume of blood cannot be controlled.	The volume of blood can be controlled by the contraction and relaxation of blood vessels.
11.	Blood flow is slow.	Blood flow is rapid.
12.	The open spaces are called sinuses and lacunae	Closed spaces involve arteries and veins.
13.	Examples: Snails, clams, cockroaches and Spiders	Examples: Humans, squids, cats, earthworms.

(iii) Difference between Xylem and Phloem

	Xylem	Phloem
1.	Xylem is a vascular tissue that transports water and dissolved minerals absorbed from the roots to the rest of the plant.	Phloem is a vascular tissue that transports soluble organic compounds prepared during photosynthesis from the green parts of the plant to the rest of the plant.
2.	It is located in the centre of the vascular bundle	It is located on the outer side of the vascular bundle.
3.	Xylem forms most of the bulk of the wood.	Phloem forms most of the bulk of the bark.
4.	Xylem, tissues are found in leaves, roots, and stems.	Phloem tissues are found in stems and leaves which later grow in the roots, fruits, and seeds.
5.	Xylem tissue is composed of xylem vessels, fibers, and tracheids.	Phloem tissue is composed of like sieve tubes, companion cells, phloem fibers, and phloem parenchyma.
6.	Xylem fibers are robust and longer.	Phloem fibers are flexible in shorter.
7.	The cells of the xylem tissue are dead cells except for the parenchyma cells.	The cells of the phloem tissue are living cells except for the blast fibers.
8.	The cell wall of the cells in the xylem is thick-walled.	The cell wall of the cells of the phloem is thin-walled
9.	The quantity of xylem tissue in the vascular bundles is more than the phloem tissue.	The quantity of phloem tissue is comparatively less in the vascular tissue.

10.	Two types of conducive cells are present in xylem; tracheids and vessels.	Only one type of conducive cell is present in phloem; sieve tubes.
11.	The conducive tissues consist of dead cells.	The conducive tissues consist of living cells
12.	The primary function of xylem is to transport water and dissolved minerals from the root to different parts of the plant.	The primary function of the phloem is to transport the prepared sugars from the leaves to different parts of the plant.
13.	The transport by xylem is unidirectional; the water and mineral are only moved up from the roots.	The transport by phloem is bidirectional; the food can travel both up and down the plant.
14.	Xylem also aids in providing physical support the plant.	Phloem is not involved in mechanical support.

(iv) Difference between Arteries and Veins

	Arteries	Veins
1.	Moves away from the heart.	Moves towards the heart.
2.	Distributes blood to the body organs.	Collects blood from body organs.
3.	Blood pressure is high in arteries.	Blood pressure in veins is low.
4.	Valves are absent.	Valves are present.
5.	Carry oxygenated blood except pulmonary artery.	Carry deoxygenated blood, except pulmonary vein.
6.	Arteries end in capillaries.	Veins start in blood capillaries.
7.	They are deep seated.	They can be seen subcutaneously.
8.	They do not collapse when there is no blood in it.	They collapse when there is no blood in it or cut across.
9.	Arteries are further divided into arterioles.	Veins are further divided into venules.
10.	They are round and relatively thick walled.	Veins are usually flattened or collapsed with thin walls.
11.	Arteries have small lumen.	Veins have large lumen.
12.	Arteries are reddish in colour.	Veins are bluish in colour.
13.	Arteries show spurty movement of blood giving pulse.	Veins show sluggish movement of blood.
14.	If arterial wall is injured, the blood comes-out like a fountain in a large area all around the artery.	If venous wall is injured, blood comes out, collects in a pool in a small area around vein.

(v) **Difference between W.B.Cs and R.B.Cs**

	Red Blood Cells	White Blood Cells
1.	These are smaller in size and more numerous in numbers.	These are larger in size and fewer in number.
2.	These are non-nucleated, biconcave disc like cells.	They are nucleated and amoeboid cells and keep on changing their shape.
3.	These cells contain a special type of protein called hemoglobin (respiratory pigment) due to which they are red in colour.	Hemoglobin is absent in WBCs due to which they are white or colourless.
4.	RBCs cannot diffuse out through capillary wall.	WBCs can diffuse out through capillary walls.
5.	RBCs help in gaseous transport.	WBCs help in killing bacteria and foreign particles.
6.	RBCs settle together to form rouleaux (i.e. stack over each other due to abnormal shape).	WBCs do not form rouleaux.

Q.41: Why capillaries are made up of single layer of endothelium?

Ans: Capillaries are made up of single layer of endothelium because Substances such as glucose, oxygen, and wastes can quickly pass through it on their way to or from the cells.

Q.42: Why veins contain semilunar valves in it?

Ans: Semilunar valves in veins prevent backflow of blood.

Q.43: Why atherosclerosis cause myocardial Infraction and stroke?

Ans: During progression of atherosclerosis, myeloid cells destabilize lipid-rich plaque in the arterial wall and cause its rupture, thus triggering myocardial infarction and stroke.

Chapter = 09

Biology 9th - Short Question Answers

➔ TRANSPORT

Q.1: Define passive and active transport?

Ans. The root absorbs water and minerals from soil through root hairs. There are two processes of transport:

(i) **Passive Transport:** The uptake of water and mineral by osmosis and diffusion without using energy of ATP. It is due to concentration gradient i.e. always takes place from high to low quantity of substances.

(ii) **Active Transport**: .Movement of substances from low quantity to high quantity i.e. against the gradient and it requires energy of ATP. This movement is called active transport.

Q.2: Describe mineral transport in plants.

Ans: **Mineral Transport:** Plants also require minerals i.e. nitrates, sulphates, phosphates etc. These minerals are also taken up by root hair in two ways:

(i) By diffusion, when the concentration of certain ions in soil is higher than that in root hair cells i.e. passive transport.

(ii) By active transport, plant requires some substance even they found in soil in low quantity. The roots have to absorb these ions against a concentration gradient by using energy of ATP, which is active transport.

Q.3: Describe the importance of diffusion with example.

Ans: **Importance of diffusion:** Importance of diffusion can be describe as follows:

(i) **Help in Biological process:** In the plants during photosynthesis and respiration the exchange of carbon dioxide and oxygen gases, between the cell and the atmosphere take place by diffusion.

(ii) **Help in transpiration**: During stomatal transpiration, water vapours from the intercellular spaces escape out in the outer atmosphere by the process.

(iii) **Small organisms use diffusion**: Many small organisms such as Amoeba and Hydra depend on diffusion for obtaining oxygen and getting rid of carbon dioxide.

(iv) **Large animals depends on diffusion:** In the lungs of large animals, the exchange of gases (carbon dioxide and oxygen) between air and blood also takes place by diffusion.

Q.4: What is meant by osmosis? Write its importance.

Ans: **Osmosis:** "It is a special type of diffusion. In this process water molecules move from higher concentration to lower concentration through semi permeable membrane." OR "Osmosis is a process by which solvent molecules (water) diffuse across selectively permeable membrane, from a region of low solute concentration to the high solute concentration."

Q.5: Define transpiration.

Ans. **Transpiration**: Plants absorb water continuously from soil. Some of its quantity utilized in photosynthesis and other metabolic function while the rest is retained in cell to maintain turgidity of cell. Some water is removed in the form of vapours. This loss of internal water of plant in the form of vapours from aerial part of plant is called transpiration. Transpiration mainly takes place through special pores guarded by specialized guard cells called. Stomata (sing: stoma).

Q.6: How many types of leaves are there on the basis of stomatal distribution?

Ans: Plants have three types of leaves on the basis of stomatal distribution.

(i) Leaves that have stomata at lower epidermis called bifacial leaves e.g. leaves of mango plant.

(ii) Leaves that have stomata at both surface (upper and lower epidermis called monofacial leaves e.g. leaves of maze plant.

(iii) Leaves that have stomata at upper epidermis only e.g. leaves of water lily.

Q.7: Describe the relation of transpiration with leaf surface.

Ans: **Relation of Transpiration with Leaf Surface:** Surface area of leaf is also an important factor for the rate of transpiration, because the larger size leaves have high number of somata which increase the rate of transpiration.

Q.8: Why the leaves of desert plants modified as spines?

Ans. The desert plants require to save their water so they have smaller size leaves or their leaves becomes spines to reduce number of stomata as well as rate transpiration.

Q.9: What is circulatory system?

Ans: **Circulatory System:** The system involved in the transport of various substances within the body of an animal is called Circulatory system. The circulatory system transports gases like O_2, CO_2 etc. nutrients, wastes, hormones and defense proteins.

Q.10: Describe the transport in animals.

Ans: **Transport in Unicellular Animals:** Cytoplasm of unicellular animals remains very much close to plasma membrane which remains in contact with environment. In these animals oxygen can diffuse through the body surface and reach easily to energy producing organelles. Similarly, the waste products can rapidly move from the body by simple diffusion.

Transport in Multicellular Animals: On the other hand, in multi-cellular organisms like mammals including man, many cells are situated away from environment. Only simple diffusion is not enough to supply O_2 (oxygen) to these cells and to get rid of wastes from there. It needs proper transport system to carry substances from one part of the body to another.

Q.11: Which type of circulatory system is found in man? Write the names of the components of the circulatory system of man.

Ans: **Transport in Man:** In man, closed type of circulatory system is found, which consists of following components.

(i) **Blood:** It is a fluid with cells and other dissolved substance.

(ii) **Heart:** It is a pumping, pulsatile organ.

(iii) **Blood Vessels:** They are tubes i.e. arteries, veins and capillaries.

This is much more efficient and rapid system of transport.

Q.12: Define heart rate.

Ans: **Heart Rate:** The number of heartbeats in a minute i.e. the heart rate can be measured by the beating of heart. On average, a healthy heart beats 72 times in a minute. The normal range of heart is 60-100 beats in a minute. It is necessary to keep the heart rate within the normal range. The slow of fast heart rate may cause severe heart diseases. The heart rate may vary from person to person.

Q.13: Define pulse rate.

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Q.17: What is vascular surgery?

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